

## Multifactor Analysis of Online Reputation as a Tool for Enhancing Competitiveness of Subjects from Automotive Industry<sup>1</sup>

Peter DORČÁK\* – Peter MARKOVIČ\* – František POLLÁK\*\*

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### Abstract

*The paper discusses the issue of online reputation, more specifically the ways and methods of its measurements in selected entities operating in the automotive sector. A thorough multifactor analysis of reputation in the virtual world of the internet was conducted on a specific sample of entities/subjects – Top 15 European bestselling car brands of year 2014 operating on a selected market. Using a careful statistical testing relationships between factors were examined in order to identify and describe basic facts affecting online reputation of selected entities in the hyper competitive market environment of the internet. The findings identified by the analysis conducted on the selected part of the global market, can be effectively used in any market for the purpose of increasing competitiveness of selected entities from (not only) automotive industry. Patterns and variables affecting virtual reputation of these entities are relatively invariable across the global internet market.*

**Keywords:** reputation, reputator, internet, automotive, competition

**JEL Classification:** A12, M31, O31

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### Introduction

Reputation is a concept commonly used in marketing management and it generally means an overall presence on the market. From the point of view of internet, we can compare it to leaving footprints. All activities are interconnected

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\* Peter DORČÁK – Peter MARKOVIČ, University of Economics in Bratislava, Faculty of Business Management, Department of Business Finance, Dolnozemska cesta 1, 852 35 Bratislava, Slovak Republic; e-mail: peter@dorcak.com; peter.markovic@euba.sk

\*\* František POLLÁK, University of Prešov in Prešov, Faculty of Management, Department of Marketing and International Trade, Konštantínova 16, 080 01 Prešov, Slovak Republic; e-mail: frantisek.pollak@unipo.sk

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and complement one another (Janouch, 2011). Each institution has a reputation or online reputation, whether they want it, or not; the reputation does exist (Marsden, 2013). If an entrepreneurs running their own businesses (or managing an institutions), they should not leave their reputation to chance. It is their ultimate responsibility. Company's reputation is considered to be very valuable asset. As George Washington once said: "With a reputation you can do anything without one, nothing" (Haywood, 2002). However, if we consider corporate reputation, its definition is a bit complicated (Griffin, 2008; Delina and Drab, 2010). Balmer and Greyser (2003) characterize corporate reputation as such which is created over time based on what the organization did and how it behaved. Company's or corporate reputation only reflects relative standing of the company, both internally with its employees and externally with other stakeholders, in both its competitive and institutional environments. Helm defines corporate reputation as a global, stable over time, evaluative judgement about a company that is shared by multiple constituencies (Helm et al., 2011). It is a pure reaction of customers, investors, employees and other stakeholders. It is a collective judgement of individual impressions (Gottschalk, 2011).

## **1. Research Problem**

### **1.1. Reputation and the Internet**

The internet has changed the way we are thinking about reputation. What was once private is now public. What was once happening on the local level is now discussed on the global level. What was once ephemeral is now permanent. What was once trusted is now unreliable (Delina and Drab, 2010). These changes happen because the internet has modified our interaction with reputation (Pollák, Nastišin and Kakalejčík, 2015). Understanding the unique relationship between technology and online culture is a key to understand how to manage online reputation (Loayza, 2013). Those who apply off-line techniques on their Internet reputation or use off-line assumptions to solve online problems are doomed to failure. Instead, the user must be capable to understand the cultural and technical differences between the internet and off-line world to effectively protect and improve his online reputation (Delina, 2014). Walter (2012) argues that reputation is a cornerstone of one's life and business. This means that reputation is very fragile and one mistake can sometimes cause irreparable damage. This is especially true in the digital world ruled by radical transparency and high standards of customers (Soviar, 2011). Entities must be able to learn to communicate on social networks, follow the "chatter" on social media and effectively respond

to such impulses without harming their reputation in line with expectations of their customers. Chernatony et al. (in Siano, Vollero and Palazzo, 2011) argues that when the internet allows consumers to share information about businesses and brands, entities have the opportunity to control information published about them. Negative comments on the internet can quickly and severely damage image and reputation of the brand.

## **1.2. Online Reputation Management**

The concept of online reputation management in our country is relatively unknown, only few domestic authors focused their researched to this issue. Despite the fact that activities involved in building and protecting brand's image and reputation should be the core interest of any entity. Online reputation management (ORM in short) can be defined as a set of tools and measures implemented for the purpose of active management of virtual reputation of the entity in the course of time. The internet is an independent world with its own rules (Saruc, Dorčák and Pollák, 2013). Information spread very rapidly and if the entity does not pay attention to communication with their clients or underestimates complaints, it may have serious problems. Reputation management in the internet environment is often referred to as Search Engine Reputation Management (SERM), and includes several major activities (Sasko, 2015):

- Online monitoring of internet users
- Communication with the public and clients
- Evaluation of results
- Crisis reputation management.

The increasing number of internet users and the related increase in users of social networks, blogs and websites where the content is generated by the users themselves now justifies the growing importance of internet monitoring. Entities can for this purpose use a variety of tools that continuously index new pages on the internet and compare them with the monitored phrases such as product name, company, competitors or any other keyword.

## **1.3. Selected Methods for Measuring Online Reputation**

Systems based on summing up and averaging – Speaking about reputation systems, Resnick and Zeckhauser (2002) in their study stated that the simplest solution how to measure a subject reputation is to sum up all the relevant positive and negative reviews. The total result related to the specific user is the difference between all positive and negative reviews. This principle is used mainly on eBay, one of the largest online markets and community with millions

registered users. After each transaction the buyer and the seller can give each other positive, negative, or neutral rating, which in turn adds plus or minus points (1, -1, and 0) to their reputation. Users can also leave comments. When people leave negative rating, they usually leave a comment that explains it. Although the eBay reputation mechanism is very simple, empirical results show it supports transactions between sellers and buyers. It is mainly due to the fact that sellers with better reputation are more likely to sell more. Also, this mechanism can prevent people to artificially boost their reputation with each other.

*Recommendation systems* – Recommendation systems are similar to systems based on summing up and averaging. Both systems collect user ratings from different communities. Nevertheless, there are also significant differences. These systems assume that different people have different taste and therefore their rating differs from other users because it is granted according to one's subjective taste. The main objective of recommendation systems, described by Tavakolifard (2012) in his study, is to reduce information overload and retain customers by selecting a subset of the universal set of products based on user preferences. In the most basic form its biggest problem are ratings for products which have not been previously identified and rated by other users. After we can estimate ratings for yet unrated items, we can recommend items with the highest estimated rating. New ratings of yet unrated items can be estimated using various techniques such as machine learning methods, approximation theory and various heuristics.

*Sentiment analysis* – Sentiment analysis or Opinion Mining may be defined as an automatic quantification of the subjective content expressed in the text form to determine the position of a commentator or scorer in respect of a given subject. It is one of the oldest and frequently used methods for measuring reputation. In general, it can be said that sentiment analysis aims to determine the attitude of the speaker/writer towards the particular topic or the overall conceptual polarity of the document. The attitude may cover author's judgment or assessment of a particular person, emotional state or the intended emotional communication, this is the emotional effect that the author wishes to impose over the recipient (Liu, 2012). It can be used in wide range of areas like services, film industry, consumer goods, measurement of the impact of online ratings and reviews, social media monitoring, reviews of products, services or brands, development forecast of stock prices based on online reviews, ratings, identification of cyberbullying, etc. Its priority tasks include identification of subjectivity, orientation, power of the sentiment carrier, classification of emotions, sarcasm detection or various comparisons (Bednár, 2014). The sequence of the measurement process begins by defining the entities in the monitored segment and its competitors in the industry. The analysis of the sentiment always takes into account first 10

results from the search engine. To limit the distortion of the results from the search engine caused by personalized search activity, influence of cookies and other factors the process uses “proxy server” which can be, for example, by the online anonymizer or web anonymous proxy (Rohal’ and Sasko, 2011). A search phrase should always be a well-known and well established name of the research subject. One of the main factors in the process is the sentiment of the results displayed after typing key words to the search engine. Sentiment can be loosely defined as the nature of the result found after entering keywords. The results may show positive, neutral, and negative feedback (see Table 1). These sentiments, in order words polarity direction of the text, as well as the position at which the result is displayed will give an idea about the research subject, thus ultimately determining its online reputation (Pollák et al., 2016). The process records the evaluation of the first 10 results in google search. After summing up the sentiment points we reach the final amount. That amount is then a starting factor in assessing the success or failure of companies in the particular segment. The following table (Table 1) shows the values assigned during the sentiment analysis:

Table 1  
Sentiment Individual Results/Position of Results

Sentiment/ Position of the result	1	2	3	4	5	6	7	8	9	10
Positive sentiment (+)	20	19	18	17	16	15	14	13	12	11
Custom web site of the organization (x)	10	9	8	7	6	5	4	3	2	1
Neutral sentiment (±)	2	2	2	2	2	2	2	2	2	2
Negative sentiment (-)	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11

Source: Rohal’ and Sasko (2011).

The Table 1 shows chronological sequence of awarding points to the analysed entities. Positive response or sentiment results in the increase of the score. The higher the position of this sentiment in the search result, the more points are awarded. Similarly, but with the opposite effect is works in identifying the negative sentiment. Points are deducted, the higher the position of the display, the bigger the deduction of points, and this significantly deteriorates reputation.

*Multifactor sentiment analysis* – Comprehensive analysis requires a comprehensive approach, using the sentiment analysis it is possible to calculate the partial score presenting the power of online reputation of entities based on the nature of the first 10 google search results. Google and its search results, however, are just one of the many ways through which potential customers can access

relevant information. According Sasko (2015) and Pollák et al. (2016) multi-factor sentiment analysis is designed to accurately measure the overall online reputation of entities. The methodology used in this survey uses 3 factors that speak about online reputation of individual entities:

- The first factor is an advanced sentiment analysis (ASA) for the first 10 results google search results divided into three basic groups. Keywords are put into the search according to the following matrix: 1<sup>st</sup> group: name of the entity, 2<sup>nd</sup> group: name of the entity + the first most searched keyword from the field the entity operates in, 3<sup>rd</sup> group: name of the entity + the second most searched keyword from the field the entity operates in. The sum of the search results sentiments of the above three groups is then used for the final score.

- The second factor is the size of the audience on social networks.

- The third factor is the number of indexed pages in the search engine Google.

## 2. Aims and Methods of the Analysis

The main objective of the paper is to present chosen option for measuring online reputation of selected entities operating in the automotive sector with an aim to increase their competitiveness through a better understanding of the basic determinants of effective management of online reputation. Based on the current state of the issue theoretical knowledge and bases were accumulated, that provide knowledge base for the subsequent empirical research. A thorough multi-factor analysis of reputation in the virtual world of the internet was conducted on a specific sample of entities – Top 15 European bestselling car brands of year 2014 (focus2move.com, 2014).

For the purpose of this research we used modified multi-factor sentiment analysis on which we would like to demonstrate model option for measuring total online reputation (TOR) of selected entities. Methodology of the modified multi-factor analysis of the total online reputation TOR (Pollák et al., 2016), brings more variability in its application on a broader spectrum of subjects than standard multi-factor analysis introduced by Sasko (2015). Moreover, it also brings a comprehensive look at the reputation of the given entity relative to the total possible reputation expressed as a percentage. Methodology used in the TOR index uses  $n$ -factors.

- The first step analyses the sentiment of the first 10 results on Google. As for the number of groups, the standard is at least three groups: 1<sup>st</sup> group: name of the entity; 2<sup>nd</sup> group: name of the entity + the first most important keyword from the field the entity operates in, in our case it was „satisfaction“; 3<sup>rd</sup> group name of the entity + the second most important keyword from the field the entity operates

in, in our case it was –„reliability“. The number of groups is not particularly limited. Quantification is then ensured by unifying the scores into the percentage form. This is based on the assumption that within a single group the entity may receive a maximum score of 155 points – the ratio 1 point = 0.645%. For purpose of our analysis with 3 groups, the entity may receive a maximum score of 465 points – the ratio 1 point = 0.215%.

- Second step identifies the determinants of online reputation, the so-called reputators. Reputator can be any determinant that can objectively affect the perceived online reputation of the entity, while its value can be quantified as a percentage. Normally these are important web pages, catalogs or social networks that can significantly affect the reputation of the entity. Given the various business fields entities operate in, reputation determinants cannot be clearly defined in advance. In terms of advantage quantification, it is possible to approach individual reputation determinants by calculation of reputators' competitive score – the amount of users (fans/customers/followers) the particular entity has relative to the sum of all tested subjects. The result serves as a basis for calculating the percentage of the reputators' competitive score (CS) of the particular entity. In other words, reputator competitive strength of the particular subject can be calculated as the size ratio of its own tribe (Socialbakers, 2015) indicated as the total number of subject followers/fans/subscribers/to the total amount of tribes of all tested subjects.

- In the third step we can calculate the total advantage of the entity's online reputation with regard to its pre-defined competitors, as follows:

Standard equation (Pollák et al., 2016) features specific determinants of online reputation and their weight. The basic reputation determinant is the ASA percentage score. The equation allows us to take into account any number of other reputation determinants. For the calculation itself it is necessary to determine the weights of individual reputation determinants which are normally determined depending on the subject and target market. If the weight of individual reputation determinants is not known in advance, the simplified formula for calculating the overall online reputation is as follows:

$$TOR = \frac{R_{ASA} + \sum_{i=1}^n R_i}{n + 1}$$

where

- $TOR$  – total online reputation in %,
- $R_i$  – reputator (% score based on a given  $i$ -th determinant of online reputation),
- $R_{ASA}$  – reputator ASA (% score based on the advanced sentiment analysis),
- $n$  – number of indicators.

In this case, the value of the overall online reputation of an entity is the arithmetic mean of individual indicators (partial scores of individual reputators).

Relations among factors (online reputation score based on the advanced sentiment analysis compared to the indices of reputation offered by the main internet players, such as Twitter, Facebook and YouTube provide as a part of their ratings) were then examined in thorough statistical testing using non-parametrical methods, such as Kendall rank coefficient, or Kruskal-Wallis one-way analysis of variance, in order to identify and describe basic facts affecting online reputation of selected entities in the hypercompetitive market environment of the internet.

### **3. Results and Discussion**

Each of the set of selected entities, in this case top 15 European bestselling car brands of year 2014 (focus2move.com, 2014), try to shape their reputation both within real and virtual world through their management. For the purposes of our research, we focused on the virtual world of the internet.

#### **3.1. Overview Table of Partial Score**

Using the advanced sentiment analysis, we calculated partial score presenting the power of online reputation of entities based on the nature of the first 10 google search results. Google and its search results are, however, only one of many ways in which potential customers can access relevant information. Considering the previous research in the field of automotive industry, we identified the following other determinants of online reputation (reputators) of automotive entities, in particular:

- Twitter (total number of followers of the official global profile),
- Facebook (total number of fans of the official global profile),
- YouTube (total number of subscribers of the official global profile).

Each of these reputators has its own system which determines the overall score. But basically all of them operate with a certain tribe of the customers (followers, fans, subscribers). For the purposes of further analysis scores of partial reputators were unified to the parameter which we named competitive strength, hereafter referred to as CS and converted into a percentage. Before we analyse the results by statistical testing, it is necessary to expound the specific values and partial score for the analysed subjects through the overview table. The Table 2 presents partial results – measured values of individual determinants/score of partial reputators of online reputation/as well as score of total (overall) online reputation.

Table 2

## Overall (Total) Online Reputation

No.	Car Brand / Result sentiment	Market share* (%)	ASA score (%)	Twitt. CS rating (%)	Faceb. CS rating (%)	Yout. CS rating (%)	Number of pages indexed by Google***	Number of Twitt. global followers	Number of Faceb. global Fans	Number of Yout. global subscribers	TOR**** Score (%)
1.	Volkswagen	11.4	39.35	0.63	1.94	2.15	295M	36 975	1 726 743	43 892	13.97
2.	Renault	7.6	9.25	1.42	0.81	1.39	200M	83 302	721 510	28 384	5.03
3.	Ford	7.1	15.27	13.14	3.42	10.37	833M	769 485	3 046 806	211 662	15.27
4.	Opel	5.8	57.84	1.18	3.19	16.79	152M	69 156	2 833 535	342 831	19.75
5.	Peugeot	5.5	42.57	1.42	9.15	1.48	168M	82 971	8 137 596	30 206	17.73
6.	Mercedes	4.7	27.74	23.65	21.75	10.26	442M	1 385 207	19 351 831	209 374	20.85
7.	Fiat	4.6	-3.44	1.53	1.66	1.08	212M	89 398	1 475 899	21 975	-0.96
8.	Citroen	4.5	33.97	1.31	9.94	0.56	119M	76 886	8 840 875	11 450	17.64
9.	Audi	4.3	27.95	22.64	1.75	22.14	310M	1 326 135	1 556 659	451 895	14.85
10.	Toyota	4.3	61.28	1.49	1.28	1.04	454M	87 069	1 138 358	21 177	16.27
11.	BMW	4.1	22.36	16.99	21.28	23.99	408M	995 147	18 932 192	489 692	21.16
12.	Nissan	3.9	33.11	11.48	15.01	4.20	343M	672 607	13 352 946	85 740	24.06
13.	Skoda	3.8	52.89	0.05	0.91	0.25	106M	3 155	813 905	5 008	13.53
14.	Hyundai	3.7	40.21	0.39	4.01	2.21	282M	22 600	3 563 994	45 110	20.30
15.	Kia	3.2	39.13	2.67	3.90	2.10	292M	156 576	3 470 072	42 888	15.23

Note: \* Market share according sales by focus2move.com (Top 15 selected from 50 bestselling European cars brands), 2014.

\*\* Absolute number of google indexed pages containing a commonly used name of the given entity as a keyword; for greater relevance, quotation marks were added around the commonly used name before search.

\*\*\* Total online reputation (TOR) calculation methodology is presented in the following subchapter.

Source: Own processing.

The first groups of measurements under the advanced sentiment analysis takes into account the first 10 search results. As a keyword we used the well-known and well established name of the entity. The final score for each of the entities has been thoroughly recorded. Based on the analysis we found that in terms of the online identity of the research subjects, the first places in the search results are dominated by websites owned or managed by particular subjects. The dominant sentiment group consisted of search results with neutral sentiment. Each car brand noted at least one positive sentiment in its first 10 google search result.

Second and third measurement brought slightly different findings in the meaning of negative sentiments. Up to three car brands actually noticed negative sentiment of the first position in their top 10 google search results, namely Volkswagen, Renault and Peugeot. The sub-scores of the first second and third measurements were summed up and unified into percentages. They can be found in Table 2 in the column ASA score.

In the second step of the analysis we identified dominant reputation determinants based on the reference researches. Reputators include the social networking site Facebook, Twitter and an online database of videos YouTube. Given the absence of ranking evaluations on these social networks we had to calculate the competitive score of individual reputation determinants. In the first step we identified the official profiles directly set up or run by a particular brand and also the number of fans of those profiles on Facebook (FCS), Twitter followers (TCS) and even subscribers of YouTube channel (YCS). The calculated score of the competitive advantage of individual reputation determinants for each of the entities was subsequently recorded in the columns TCS, FCS, and YCS. The analysis revealed that each of the selected brands has its official profiles on each sites. With regard to the number of fans on Facebook, the highest numbers scored Mercedes with almost 20 million fans and BMW with almost 19 million fans with a fairly large margin over the third Nissan. When it comes to Twitter, most car brands in the top 15 have gradually started to use this communication channel popular mainly among young people. In terms of followers, Mercedes dominates with more than 23% share, which in absolute terms represents 1.3 million followers. When it comes to YouTube, car brands in the top 15 use this channel very rarely. In terms of subscribers BMW is in the leading position with almost half of millions of subscribers of its YouTube channel. With regard to the overall strength of car brands online reputation, Nissan is a clear winner, especially given the complexity with which the brand approaches modern marketing communication tools.

### 3.2. The Analysis of the Relationship between Reputation Determinants

We consider it necessary to examine the correlation between reputation determinants, more precisely the correlation between the selected reputation determinants. Partial scores of entities from individual reputators were statistically tested in order to determine whether on the chosen significance level there is a statistically significant correlation between scores of entities achieved with various reputators and score achieved through advanced sentiment analysis. Last but not least variables such as the score achieved through the advanced sentiment analysis and the absolute number of pages indexed by Google containing a generally used the name of an entity as the key word were statistically tested. Regarding the link between scores of entities achieved through different reputators and scores achieved through advanced sentiment analysis, statistical testing almost in all cases did not confirm any link between variables on the significance level we selected.

Table 3

#### Link between ASA and other Reputators

Variables	Kendall Tau. Level of significance: $p < 0.05$			
	No.	Kendall tau	Z	p-value
ASA & TCS	15	-0.409524	-2.12795	0.033341
ASA & FCS	15	-0.104762	-0.544359	0.586195
ASA & YCS	15	-0.200000	-1.03923	0.298698

Source: Own processing.

Regarding the link between scores achieved by means of an extended sentiment analysis and the absolute number of pages indexed by Google, statistical testing did not confirm any link between variables on the significance level we selected.

Table 4

#### Link between ASA and Google Index

Variables	Kendall tau, Level of significance: $p < 0.05$			
	No.	Kendall tau	Z	p-value
ASA & Google Index	15	-0.172251	-0.895041	0.370765

Source: Own processing.

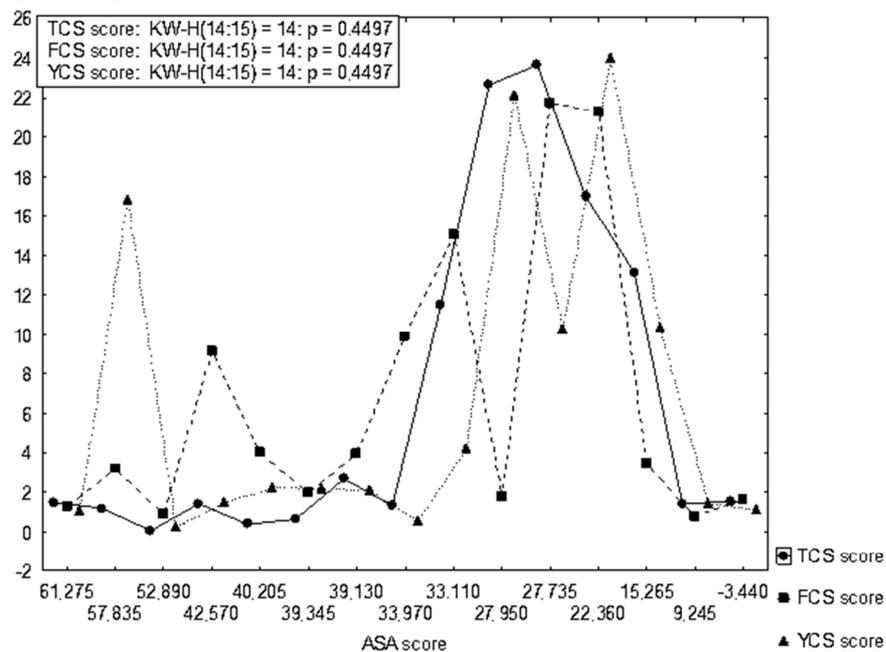
On the selected significance level of 5% the p value is much higher than 0.05. Statistically significant link between the number of pages indexed by Google and the ASA score was not confirmed. Absolute number of pages indexed by Google which include usual name of the given entity as a keyword does not have any statistically significant impact on the level of online reputation ASA score of

that entity. The proven argument for the necessity of quality over quantity applies here as well.

For better interpretation we used Kruskal-Wallis nonparametric test of variance analysis for further testing. By using this test, we basically test the influence of levels of a selected factor on the variability of values of analysed variable. In our case, the influence of ASA score on partial scores of Twitter, Facebook and YouTube was tested. Since the p value is much higher than 0.05, there is no statistically significant link between ASA and other reputators. Graphic interpretation of tested variables it is displayed on Figure 1.

Figure 1

### Graph of Dependencies



Source: Own processing in Statistica 12.

The scale of assessments of individual entities based on the ASA score is located the X axis, percentage assessment of entities is located on the Y axis.

## Conclusions

Independent position of the online reputation index ASA based on the advanced analysis of the sentiment, that represents users' views of the model internet user searching for information through the google search engine, comparing to

reputation indices that are provided by the main internet players, such as Twitter, Google and Facebook as a part of their ratings (expressed as the total numbers followers, fans or subscribers), is one of the major finding of the conducted analyses. This only encourages the need for continuing efforts towards building online reputation, not only on the pages of the main players operating directly in the automotive sector, but also towards the main players such as internet editions of mainstream newspapers, Wikipedia, catalogues, internet discussions, or notable bloggers. These players will help eliminate neutral or even negative reputation on the internet and will thus directly contribute to an increase in competitiveness of active entities, as opposed to their passive competitors.

In general, it might seem at first that the best model of online reputation management of an automotive industry entity consists mainly of active management of its own profiles on one key platform – Google (search results). From the perspective of spending resources, the possibility of active managing a limited number of profiles on selected platforms (and alleged benefiting from the absence of actively maintaining “other” profiles providing the possibility of entity assessment) appears to be optimal. From the perspective of sustainability of this form of e-marketing, however, it was a very short-sighted action. Due to the relatively open nature of the internet, it is only a matter of time when the abandoned profiles on the remaining platforms (notably Twitter) will be superseded by the profiles from third sides entities outside the scope of that entity. In such a case, the given car brand loses its direct influence over the active administration of a given profile and authenticity of presented content, thereby exposing itself to the increased risk of getting under unwanted pressure of competition on the increasingly fierce market environment. It is therefore essentially a necessity to deal with using e-marketing tools. Only a comprehensive approach can result in a sustainability of active e-marketing in a highly competitive automotive (not only) market.

The findings identified by the analysis conducted on the European market (in this case, used as a model example) can be effectively used in any market for the purpose of increasing competitiveness of selected automotive entities. Patterns and variables affecting virtual reputation of these entities are relatively invariable across the global internet market.

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